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News Release

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For immediate release

Argonne's Advanced Photon Source Lit the Way to Chemistry Nobel

ARGONNE, Ill. (Oct. 7, 2009) – All three recipients of the 2009 Nobel Prize in Chemistry published papers on their award-winning work based on data collected at the U.S. Department of Energy's (DOE) Argonne National Laboratory.

Between them, biochemists Thomas Steitz of Yale University, Ada Yonath of Israel's Weizmann Institute, and Venkatraman Ramakrishnan of Cambridge, England's Medical Research Center have published more than 60 papers that describe research performed at Argonne's Advanced Photon Source (APS), which is supported by the DOE Office of Science. The three shared the award for their study of the structure and function of the ribosome.

Opened in 1996, the APS — a synchrotron light source — provides the brightest coherent X-ray beams in the Western Hemisphere. While the initial crystallographic experiments into the structure of the ribosome were performed in Europe, the construction of the APS enabled the laureates to view and understand the protein-producing large cellular assembly at a resolution far greater than ever before, said Argonne biophysicist Andrzej Joachimiak, who heads the laboratory's Structural Biology Center (SBC).

"Argonne was the first place where scientists could visualize this extraordinarily complex combination of macromolecules at the atomic level," Joachimiak said. "These studies could not have been done without synchrotron light sources and X-ray crystallography, and the APS is one of just a few places in the world where this research can be done."

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The ribosome works as a protein factory in all organisms from humans to bacteria. As genetic material carrying the code for the protein sequence – messenger ribonucleic acid (mRNA) – passes through the ribosome, transfer RNAs bring a chain of amino acids to the ribosome, creating a protein, which in turn facilitates the vast majority of biochemical processes within the organism.

The X-ray beamlines at the APS were especially suited to the Nobel-winning work because they allowed the researchers to focus their beams to a very small diameter, enabling them to view the assembly's subunits with much finer detail than ever before.

The improved knowledge of the structure and function of the ribosome — especially in bacteria — has opened up a new avenue of medical research as scientists try to identify antibiotics that can interfere with bacterial protein synthesis, according to Joachimiak. "This is one of the most important processes that occurs within the cell, and the work done at Argonne provided one of the first opportunities for scientists to truly look 'under the hood' at the biochemical mechanisms that underpin it," he said.

In all, the SBC has contributed to 69 studies of ribosomes and ribosomal subunits, according to Joachimiak.

Steitz and Ramakrishnan also performed studies at the National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory in New York; Steitz also performed work at the Advanced Light Source at Lawrence Berkeley National Laboratory in California; Yonath and Ramakrishnan also completed experiments at the European Synchrotron Radiation Facility in Grenoble, France; and and Ramakrishnan worked at the Swiss Light Source in Villigen, Switzerland. Although most of the Argonne Nobel-related work was performed at the SBC's beamline at the APS, Steitz and Yonath also used two other APS beamlines: GMCA-CAT and BIOCARS. The Northeastern Collaborative Access Team (NE-CAT, Sector 24 at the APS) was also used by Thomas Steitz. Yonath is also a member of the SBC advisory committee.

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